

# Ionospheric Interference

## — Another Pandora's Box? —

*These secret military tests are using 'Tesla' technology in and upon the Earth's ionosphere.*

*Is it to become a battleground, or will it be used as a weapon?*

by Nick Begich, Jr

PO Box 201393  
Anchorage, Alaska 99520, USA  
Phone: (907) 694 1277

In Alaska, a joint project of the US Navy, Air Force and University of Alaska will soon be up and operational. The project is the High-frequency Active Auroral Research Program (HAARP). This program was described for the public as an auroral research project but has little or nothing to do with the northern lights. The project name is but the mask behind which the Military hides. The facility, scheduled to open this fall, will be used to alter the ionosphere in a manner which will lead to the implementation of technology which could be used to change weather patterns, change the chemical composition of the ionosphere, or block all global communications.

In reading the materials gathered for this story, one thing is clear: the Government of the United States does not really know what the full impact of this technology will be; yet, they are willing to tamper with all of our lives in the interest of their version of global security. If the technology proves to be effective, then the question arises: is it in humanity's interest for a single government, or any government, to have control over technology which could effectively stop all communications or change the planet's weather patterns?

This article was stimulated by a short piece in the April-May 1994 issue of *NEXUS*. The idea that *NEXUS* would quote an Alaskan daily newspaper sparked my interest in further researching the story. The story was based on a letter to the editor written by Eric Nashlund which appeared in the *Anchorage Daily News* (November 20, 1994). In part, the letter stated:

"Some startling revelations came to light while researching the background of a military sponsored project starting construction in Gakona... HAARP 'will be used to understand, stimulate and control ionospheric processes that might alter the performance of communication and surveillance systems' according to a HAARP fact sheet. The HAARP environmental impact statement claims negligible ionospheric impact with no impact to climate, weather or ozone layer.

"An ARCO company has the bid for construction of HAARP: ARCO Power Technologies Inc. APTI holds a patent (#4,686,605) which matches closely the HAARP proposal dealing with transmitting extremely large amounts of radio-frequency energy into the ionosphere. It is evident that HAARP will at least test, if not fully implement, the patent capabilities.

"Patent #4,686,605 claims it has the following uses: 'cause...total disruption of communications over a very large portion of the Earth...disrupting not only land-based communications, but also airborne communications and sea communications (both surface and subsurface)...missile or aircraft destruction, deflection, or confusion...weather modification...by altering solar absorption...ozone, nitrogen, etc. concentrations could be artificially increased..."

The United States Military denies that the HAARP project has anything to do with these patents. However, a careful review of the government documents leading to the contract with APTI leads one to the conclusion that, once again, the Military is deliberately attempting to mislead. While it is true that the device being built will not produce the full effects described in the patents, it is a necessary step in proving the effectiveness of the technology in advance of construction of a larger antenna array which is scheduled to begin construction next [northern] summer in Alaska. The intention of the Military is to complete construction of the larger second system by 1997.

This initial project does present risks to communications according to the United States Department of Commerce, National Telecommunications and Information Administration, Interdepartment Radio Advisory Committee. Other risks are unclear in the literature related to this project; however, the risks to human physiology from high-frequency electromagnetic radiation are well known. What is really going on with this technology? What will the government do when they put into practice the larger antenna array?

Having read the article in *NEXUS*, the next stop was to the public library. I pulled the Eastlund patent records and a cold chill ran through me as I realised that the diagrams I was seeing were reminiscent of patents issued to Nikola Tesla in the late 19th and early 20th century. Tesla was most well-known for having obtained, in 1888, patents for his entire system of polyphase AC power which remains today the world standard. I next noted the reference sources in the patent itself: two articles from *The New York Times*. When I reviewed the articles, they were about Tesla. The articles referenced in the US patent

w e r e extremely interesting in that they were, in part, the basis for the research into this technology. The first article from *The New York Times* (December 8, 1915) reads, in part, as follows:

"Nikola Tesla, the inventor, has filed patent applications on the essential parts of a machine, the possibilities of which test a layman's imagination and promise a parallel of Thor's shooting thunderbolts from the sky to punish those who had angered the gods... Suffice it to say that the invention will go through space with a speed of 300 miles a second, a manless ship without propelling engine or wings, sent by electricity to

any desired point on the globe on its errand of destruction, if destruction its manipulator wishes to effect.

"It is not a time," said Dr Tesla yesterday, 'to go into the details of this thing. It is founded upon a principle that means great things in peace; it can be used for great things in war. But I repeat, this is no time to talk of such things.'

"It is perfectly practicable to transmit electrical energy without wires and produce destructive effects at a distance. I have already constructed a wireless transmitter which makes this possible, and have described it in my technical publications, among which I refer to my patent number 1,119,732, recently granted. With transmitter of this kind we are enabled to project electrical energy in any amount to any distance and apply it for

innumerable purposes, both in war and peace. Through the universal adoption of this system, ideal conditions for the maintenance of law and order will be realized, for then the energy necessary to the enforcement of right and justice will be normally productive, yet potential, and in any moment available, for attack and defense. The power transmitted need not be necessarily destructive, for, if distance is made to depend upon it, its withdrawal or supply will bring about the same results as those now accomplished by force of arms."

The next article referenced in the patent also ran in *The New York Times* (September 22, 1940) and reads, in part, as follows:

"Nikola Tesla, one of the truly great inventors who celebrated his eighty-fourth birthday on July 10, tells the writer that he stands ready to divulge to the United States Government the secret of his 'teleforce' with which, he said, airplane motors would be melted at a distance of 250 miles, so that an invisible Chinese Wall of Defense would be built around the country...

"This 'teleforce', he said, is based on an entirely new principle of physics that 'no one has ever dreamed about', different from the principle embodied in his inventions relating to the transmission of electrical power from a distance, for which he has received a number of basic patents. This new type of force, Mr Tesla said, would operate through a beam one one hundred-millionth of a square centimeter in diameter, and could be generated from a special plant that would cost no more than \$2,000,000 and

would take only about three months to

construct.

"The beam, he states, involves four new inventions, two of which already have been tested. One of these is a method and apparatus for producing rays 'and other manifestations or energy' in free air, eliminating the necessity for a high vacuum; a second is a method and process for producing 'very great electrical force'; the third is a method for amplifying this force; and the fourth is a new method for producing 'a tremendous electrical repelling force'. This would be the projector, or gun, of the system. The voltage for propelling the beam to its objective, according to the inventor, will attain a potential of 50,000,000 volts.

"With this enormous voltage, he said, microscopic electrical particles of matter will be catapulted on their mission of defensive destruction. He has been working on this invention, he

## United States Patent (19)

Eastlund

[54] **METHOD AND APPARATUS FOR ALTERING A REGION IN THE EARTH'S ATMOSPHERE, IONOSPHERE, AND/OR MAGNETOSPHERE**

[75] Inventor: Bernard J. Eastlund, Spring, Tex.

[73] Assignee: APTI, Inc., Los Angeles, Calif.

[21] Appl. No.: 690,333

[22] Filed: Jan. 10, 1985

[51] Int. Cl.: H05B 6/64; H05C 3/00; H05H 1/46

[52] U.S. Cl.: 361/231; 89/1.11; 38/059; 244/158 R

[58] Field of Search: 361/230, 231; 244/158 R; 376/100, 89/1.11; 380/59

[56] Reference Cited PUBLICATIONS

Liberty Magazine, (2/35) p. 7 N. Tesla.

New York Times (9/22/40) Section 2, p. 7 W. L. Laurence

[11] Patent Number: 4,686,605

[45] Date of Patent: Aug. 11, 1987

New York Times (12/8/15) p. 8 Col. 3.

Primary Examiner—Salvatore Cangialosi

Attorney, Agent or Firm—Roderick W. MacDonald

**ABSTRACT**

A method and apparatus for altering at least one selected region which normally exists above the earth's surface. The region is excited by electron cyclotron resonance heating to thereby increase its cyclotron particle density. In one embodiment, circularly polarized electromagnetic radiation is transmitted upward in a direction substantially parallel to and along a field line which extends through the region of a plasma to be altered. The radiation is transmitted at a frequency which excites electron cyclotron resonance to heat and accelerate the charged particles. This increase in energy can cause ionization of neutral particles which are then absorbed as part of the region thereby increasing the charged particle density of the region.

15 Claims, 5 Drawing Figures

The diagram shows a globe with the North Pole at the top and the South Pole at the bottom. A horizontal line represents the EQUATOR. At the North Pole, there is a TRANSMITTER (16) and a POWER GENERATOR (17). Various field lines and regions are labeled with numbers and letters: 10, 12, 13, 14, 15, 18, 19, 20, M<sub>B</sub>, and C. The globe is surrounded by several concentric, roughly elliptical lines representing field lines or regions of influence.

added, for many years and has recently made a number of improvements in it."

There was a third reference which was apparently authored by Tesla which could not be obtained. The ideas expressed by Tesla in these articles raise more questions about the version of 'law and order' likely to rise from any military organisation controlling such technology. In recent days, we have seen many of the excesses of the military establishment in testing their 'peace-keeping' technologies to the detriment of individuals in the population. If this technology is to be implemented anywhere, it should be done so openly and honestly, and only when it can be demonstrated as safe and worthwhile for improving the human condition. The idea of unleashing such power into our planet's ionosphere is disturbing at a minimum.

The patent number 4,686,605, issued August 11, 1987 to Bernard J. Eastlund and assigned to APTI, Inc., is one of three related patents by the same inventor—one of which was locked up under a Navy National Security Order for six years in the late 1980s. In the text of the patent, a number of issues of concern are raised. These patents revisit and go beyond the technical applications envisioned by Tesla. The patent is quoted as follows:

"In the past several years, substantial effort has been made to understand and explain the phenomena involved in belts of trapped electrons and ions, and to explore the possible ways to control and use these phenomena for beneficial purposes. For example, in the late 1950s and early 1960s both the United

States and the USSR detonated a series of nuclear devices of various yields to generate large numbers of charged particles at various altitudes, e.g., 200 kilometers or greater...

"This can cause confusion of or interference with or even complete disruption of guidance systems employed by even the most sophisticated of airplanes and missiles. The ability to employ and transmit over very wide areas of the Earth a plurality of electromagnetic waves of varying frequencies, and to change same at will in a random manner, provides a unique ability to interfere with all modes of communication, land, sea, and/or air, at the same time. Because of the unique juxtaposition of usable fuel source at the point where desirable field-lines intersect the Earth's surface, such wide-ranging and complete communication interference can be achieved in a reasonably short period of time... Thus, this invention provides the ability to put unprecedented amounts of power in the Earth's atmosphere at strategic locations and to maintain the power injection level, particularly if random pulsing is employed, in a manner far more precise and better controlled than heretofore accomplished by the prior art, particularly by the detonation of nuclear devices of various yields at various altitudes... Further, by knowing the frequencies of various electromagnetic beams employed in the practice of this invention, it is possible not only to interfere with third party communications but to take advantage of one or more such beams to carry out a communications network even though the rest of the world's communications are disrupted. Put another way, what is used to disrupt another's communications can be employed by one knowledgeable of this invention as a communication network at the same time. In addition, once one's own communication network is estab-

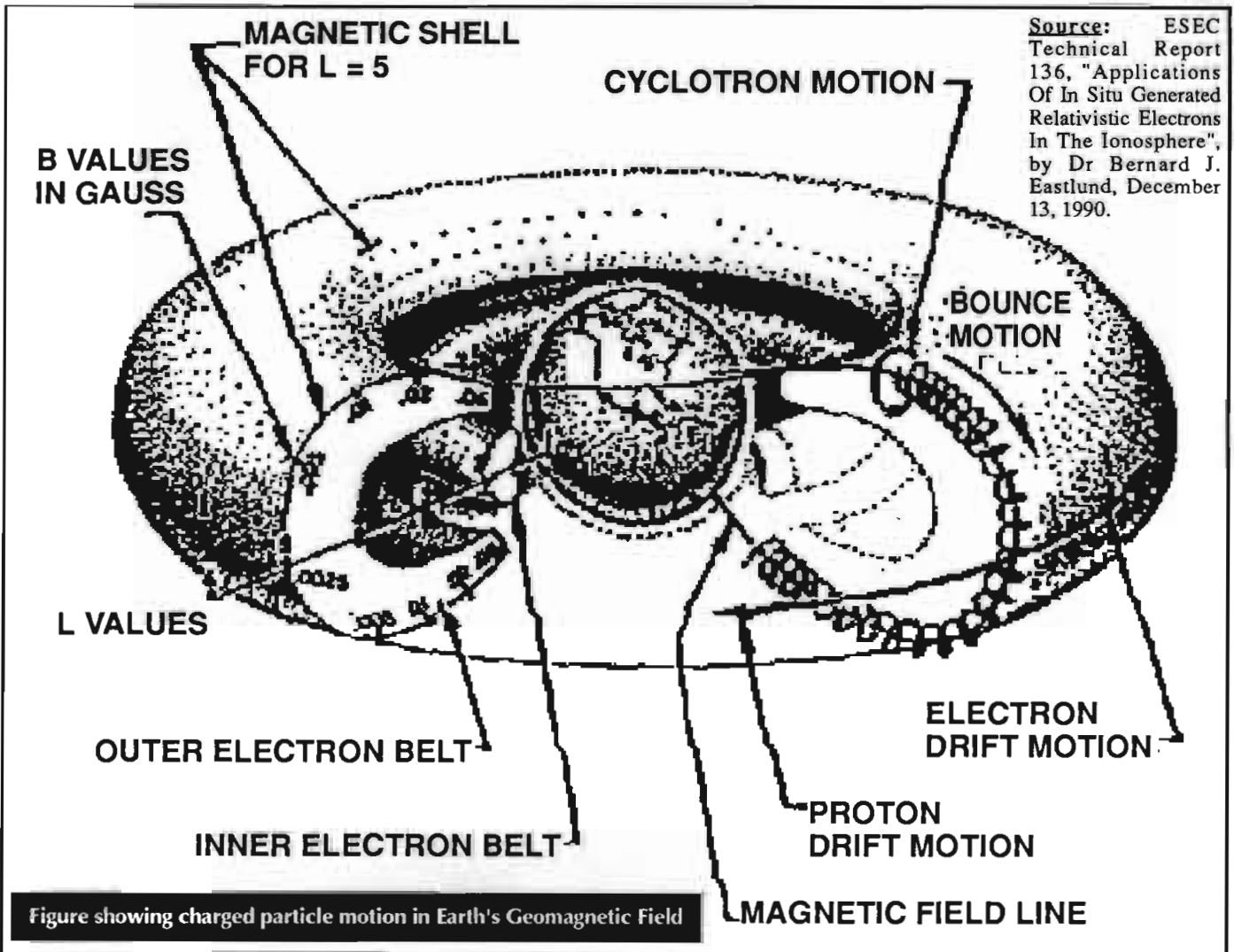


Figure showing charged particle motion in Earth's Geomagnetic Field

lished, the far-reaching extent of the effects of this invention could be employed to pick up communication signals of others for intelligence purposes...

"This invention has a phenomenal variety of possible ramifications and potential future developments. As alluded to earlier, missile or aircraft destruction, deflection, or confusion could result, particularly when relativistic particles are employed. Also, large regions of the atmosphere could be lifted to an unexpectedly high altitude so that missiles encounter unexpected and unplanned drag forces with resultant destruction or deflection of same. Weather modification is possible by, for example, altering upper atmosphere wind patterns by constructing one or more plumes of atmospheric particles which will act as a lens or focusing device. Also as alluded to earlier, molecular modifications of the atmosphere can take place so that positive environmental effects can be achieved. Besides actually changing the molecular composition of an atmospheric region, a particular molecule or molecules can be chosen for increased presence. For example, ozone, nitrogen, etc., concentrations in the atmosphere could be artificially increased. Similarly, environmental enhancement could be achieved by causing the breakup of various chemical entities such as carbon dioxide, carbon monoxide, nitrous oxides, and the like..."

While the device being constructed is not large enough to cause all of these effects, it is of sufficient size to test the ideas of Dr Eastlund as expressed in parts of the patent. The Military denies that they are using any of the Eastlund ideas; however, careful review of the materials lead to the inescapable conclusion that the Military is misleading the public again.

In a press release by the United States Air Force dated November 3, 1993, the Military announced that the prime contractor on the HAARP project was ARCO Power Technologies, Inc. The press release indicated that the project was designed for auroral and ionospheric research. They indicate: "The first phase of the program is underway to develop and test a low-power high-frequency (2.8-10.0 MHz) prototype transmitter array."

ARCO Power Technologies, Incorporated (APTI) is a subsidiary of Atlantic Richfield Company (ARCO) which owned the Eastlund patent rights at the time the HAARP project was put out to bid. In researching APTI, I utilised the directory, *America's Corporate Families 1993* (vol. 1, p. 156), which is a Dun & Bradstreet publication. The record indicates that this firm has a president in Los Angeles and a CEO and staff of 25 employees in Washington, DC, with sales of US\$5,000,000 a year. ARCO, the parent company, is the largest employer in Alaska, primarily involved in the North Slope where it controls trillions of cubic feet of natural gas and billions of barrels of oil. The natural gas on the North Slope has been injected into the Earth rather than 'flared off' as in most parts of the world. The gas has been injected in order to maintain oilfield production while pumping up to 1.6 million barrels of crude oil a day. No market for this gas currently exists, although significant interest in building a US\$12 billion pipeline remains on the drawing boards. A market for the gas is in the interests of ARCO.

How does a small subsidiary company acquire a military contract for such a project? According to the records, it won the right to build the project through exemptions in the military procurement process. The contract with APTI was over five times the

organisation's annual sales. It is the assertion of this writer that the only way a virtually unknown company in the military contracting environment could get such a contract is if they possessed proprietary information of use in the project, i.e., the Eastlund patents.

In a fact sheet issued by the Office of Naval Research and the Phillips Laboratory about HAARP, dated November 4, 1993, the following is indicated:

"The proposed research will be undertaken using high-power radio transmitters to probe the overhead ionosphere, combined with a complement of modern scientific diagnostic instruments to investigate the results of the interactions.

"HAARP will be constructed at auroral latitudes in Alaska. A unique feature of the research facility would be a high-power high-frequency radio transmitter with the capability of rapidly steering a narrow beam of energy toward a designated region in the sky. Similar, though less capable, research facilities exist today at many locations throughout the world and are operated routinely for the purpose of scientific investigation of the ionosphere. In the US such systems are located in Arecibo, Puerto Rico, and Fairbanks, Alaska. Other installations are at Tromsø, Norway; Moscow, Nizhny Novgorod and Apatity, Russia; Kharkov, Ukraine; and Dushanbe, Tadjikistan. None of these existing systems, however, have the combination of frequency capability and beam steering agility required to perform the experiments planned for HAARP.

"Investigations to be conducted at the HAARP facility are expected to provide significant scientific advancements in understanding the ionosphere. The research facility would be used to understand, stimulate and control ionospheric processes that might alter the performance of communication and surveillance systems. This research would enhance present civilian capabilities because it would facilitate the development of techniques to control ionospheric processes..."

"Potential applications of the HAARP research include devel-

oping DoD technology for detecting cruise missiles and aircraft and for communicating with submarines. Although HAARP is being managed by the Air Force and Navy, it is purely a scientific research facility which represents no threat to potential adversaries and would therefore have no value as a military target.

"...The beam would be several degrees wide, depending on frequency, and thus would influence a region several miles in diameter in the lower ionosphere, expanding to several tens of miles in the upper ionosphere.

"...The transmissions would be accomplished through the design and construction of a world-class ionospheric research instrument (IRI)... The IRI would consist of an antenna array and associated transmitters... The antenna would occupy a rectangular area roughly 1,000 ft x 2000 ft and would consist of a 12 x 15 array of antenna masts, each supporting two horizontal crossed dipole antennas, stacked one above the other. The masts would reach a maximum height of 72 ft..."

"As a result of a competitive procurement, the Air Force and Navy has awarded a contract to ARCO Power Technologies, Inc. (APTI) for the design and construction of the IRI and associated support facilities... The current schedule anticipates construction at the Gakona site would begin November 1993 and conclude the fall of 1994 with the demonstration prototype. Construction for the full-size IRI is anticipated to begin early 1995 and conclude late 1997."

**It is the assertion of this writer that the only way a virtually unknown company in the military contracting environment could get such a contract is if they possessed proprietary information of use in the project, i.e., the Eastlund patents.**

The following was taken from the United States Air Force "Record of Decision, High-frequency Active Auroral Research Program (HAARP), Final Environmental Impact Statement", dated October 18, 1993:

"The data obtained from the proposed research would be used to analyze basic ionospheric properties and to assess the potential for developing ionospheric enhancement technology for communications and surveillance purposes... The research facility would be used to understand, simulate and control ionospheric processes that might alter the performance of communications and surveillance systems... Furthermore, and possibly more significant, is the potential for new technology that could be developed from a better understanding of ionospheric processes. A potential DoD application of the research is to provide communications to submerged submarines. These and many other research applications are expected to greatly enhance present DoD technology.

"The Air Force and Navy proposes to build and operate the most versatile and capable ionospheric research facility in the world. The government intends to utilize the unused Over-the-Horizon Backscatter site near Gakona, Alaska for this program... Research requirements stipulated that the selected site must fall in the range of latitudes between 61 and 65 degrees, either north or south. This latitude provides the proper mix of active and inactive auroral states. Siting constraints included that the site must be: on US soil, on DoD land to the maximum extent practical..."

This project is more particularly described in the "Joint Services Program Plans and Activities" (February 1990), issued by the Navy and Air Force. It becomes clear that the Military has no intention of looking at the northern lights, as the aurora is called in Alaska. This project is intended for one purpose and one purpose

only: to learn how to manipulate the ionosphere in a manner similar to and exceeding the capabilities of the facilities operating in the Soviet Union. This facility will be the largest of its type in the world and will be located in a latitude most conducive to the practice of the invention developed by Eastlund.

In researching this project I searched a database for local articles about HAARP, and located a multi-page piece which was run in a news supplement to the *Anchorage Daily News*, "We Alaskans" (December 15, 1991, pp. 9-14). It was actually a reprint from an earlier article in *The Washington Post*. Alaska's United States Senator, Ted Stevens, is quoted in the article defending the funding of HAARP. It appears from the article that the Senator may have been left with incomplete information by the project's promoters. Nonetheless, his comments on the project were interesting. The article is quoted as follows:

"At the hearing of the Senate Committee on Rules and Administration in June 1990, Stevens defended earmarking and attacked the process of scientific peer review: 'I could tell you about the time when the University of Alaska came to me and said it might be possible to bring the aurora to Earth. We might be able to harness the energy in the aurora...,' the Senator declared according to the hearing. 'No one in the Department of Defense, no one in the Department of Energy, no one in the executive branch was interested in pursuing it at all. Why? Because it did not come from the good old boy network. So I did just what you say I should do. I got Congress to earmark the money, and the experiment is going on now. It will cost \$10 million to \$20 million. If it is successful, it will change the history of the world.'

"In August 1990, Stevens went to the Senate floor to once

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Stan Ross  
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Graydon Rixon  
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again praise the potential in the sky. 'We have in Alaska what I consider to be one of the most exciting research projects that I have ever encountered,' he said. 'It is the experiments that are going on, trying to determine if it is possible to harness the energy of the electrojet for the use of mankind.' The experiment, he went on, 'has the potential of using a laser beam to be a conductor of this energy back to Earth... It is an experiment that, when I first heard about it, I thought someone had rewritten a new chapter of Jules Verne.'

"The bill went to the Senate House Defense Appropriations Conference Committee, which then waived both the Competition in Contracting Act and a 1988 law requesting merit review of defense grants to Universities."

The project costs are between US\$25 and \$30 million and it appears that those informing the Senator about this project may not have given him clear and complete information. The result was that the project got a reputation as a 'pork' project and was declared by the press a waste of money. The Senator was misled by information distorted perhaps by those seeking his help in funding the work. Nonetheless,

the project got the money needed to make it a reality.

In the May-June 1994 issue of *Microwave News*, Eastlund describes a "full, global shield" of accelerated electrons created with RF transmitters. The HAARP project "obviously looks a lot like a first step towards this," Eastlund said. He noted, however, that the applications he has described would require a significantly more powerful device with a much larger antenna—perhaps 20 square kilometres—than the full-scale HAARP IRI.

The inventor, Dr Eastlund, in a letter reviewed the HAARP request for proposal issued by the Military and concluded that "review of the HAARP RFP has convinced me that the planned antenna could be considered a first step towards the antenna described in the patents." He stated further: "The beneficial civilian uses of the antenna are as interesting as the military applications. For example, I am working on the use of the antenna for replenishment of ozone in the ozone 'holes' over the Arctic and Antarctic."

While the Military continues to deny that the Eastlund patents are being utilised in this project, the switch will be thrown and

we shall all soon see if zapping the ionosphere will be one more step in control of environments and free communication systems. We can hope that this technology, which has the profound possibility of correcting some of the human-generated problems of ozone depletion and air pollution, will be used for all of our benefit. This writer is of the conviction that many of those engaged in the service of national security have yet to demonstrate an enlightened understanding of the balance between control and freedom. ∞

**About the author:**

Nick Begich, Jr was born and raised in Alaska. He is the eldest son of the late United States Congressman and Alaska State Senator, Nick Begich, Sr.

Nick, Jr is currently employed by the Anchorage School District as a mid-level manager. He is past President of the Anchorage Council of Education and the Alaska Federation of Teachers.

He is currently pursuing his interests in government and science as an independent researcher. Mr Begich has committed his resources and time to the improvement of the human condition and welcomes open communication.

References:

1. "Record of Decision, High-frequency Active Auroral Research Program (HAARP), Final Environmental Impact Statement, Gakona, Alaska", James F. Boatright, Deputy Assistant Secretary of the Air Force, October 18, 1993.
2. "Final Environmental Impact Statement — Volume 1: Proposed High-frequency Active Auroral Research Program", July 1993, pp. 10.124-127.
3. Dr Bernard J. Eastlund, "Applications of In Situ Generated Relativistic Electrons in the Ionosphere", ESEC Technical Report 136, Eastand Scientific Enterprises Corp., Spring, Texas, USA, Dec. 13, 1990.
4. Bernard J. Eastlund, *US Patent #4,686,605*, "Method and Apparatus for Altering a Region in the Earth's Atmosphere, Ionosphere, and/or Magnetosphere", August 11, 1987.
5. Bernard J. Eastlund and Simon Ramo, *US Patent #4,712,155*, "Method and Apparatus for Creating an Artificial Electron Cyclotron Heating Region of Plasma", December 8, 1987.
6. Bernard J. Eastlund, *US Patent #5,038,664*, "Method for Producing a Shell of Relativistic Particles at an Altitude above the Earth's Surface", August 13, 1991.
7. "Specification No. SS-HAARP-02 — System Specification for the ONR and the Air Force PL HF Active Auroral Research Program Ionospheric Research Instrument (HAARP IRI), Option 1", March 2, 1992.
8. Richard Williams, "Atmospheric Threat", *Physics and Society*, vol. 17, no. 2, April 1988, p. 16.
9. Susan Cohen, "Porkpie in the Sky", *Anchorage Daily News*, October 14, 1990, "We Alaskans" feature, pp. 8-14.
10. Letter from John L. Heckscher (US Air Force HAARP PL) to Alaska State Representative Jeannette James, dated November 12, 1993.
11. Letter from John L. Heckscher (US Air Force Ionospheric Applications Branch, Ionospheric Eff. Division) to Mr Larry Flanagan, dated June 3, 1993.
12. *America's Corporate Families 1993*, Dun and Bradstreet, Inc., vol. 1, p. 156.
13. "The HAARP Project", *NEXUS Magazine*, vol. 2, no. 19, April-May 1994, p. 9.
14. Letter to Claire Zickuhr from Dr Bernard J. Eastlund, dated December 30, 1993.
15. "US Military Plans Powerful RF 'Heater' for Ionospheric Studies", *Microwave News*, vol. XIV, no. 3, May-June 1994.
16. "HAARP — HF Active Auroral Research Program — Joint Services Program Plans and Activities", Air Force Geophysics Laboratory and Navy Office of Naval Research, February 1990.
17. "Air Force Selects Gakona Alaska for Ionospheric Research", press release, Hanscom Air Force Base, Massachusetts, November 3, 1993.
18. "HAARP Fact Sheet", Office of Naval Research and Phillips Laboratories, November 4, 1993.
19. Letter from Bernard Eastlund to Alex Chadwick National Public Radio, dated September 27, 1991.
20. Laurence, "Death Ray' for Planes", *The New York Times*, September 22, 1940, Section 2, p. 7.
21. "Tesla's New Device Like Bolts of Thor", *The New York Times*, December 8, 1915, col. 3, p. 8.
22. Letters and "Ionospheric Research Instrument Report" from Arthur H. Grey, Secretary, Spectrum Planning Subcommittee, IRAC, to Eric Nashlund, United States Department of Commerce, National Telecommunications and Information Administration, Interdepartment Radio Advisory Committee, 1993-94.